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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/731,481	12/06/2000	Zicheng Liu	MSI-684US	1300
22801	7590	03/29/2004	EXAMINER	
LEE & HAYES PLLC 421 W RIVERSIDE AVENUE SUITE 500 SPOKANE, WA 99201			BHATNAGAR, ANAND P	
			ART UNIT	PAPER NUMBER
			2623	4

DATE MAILED: 03/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/731,481

Applicant(s)

LIU ET AL.

Examiner

Anand Bhatnagar

Art Unit

2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 7, 10-13, 15, 16, 20-25, 27, 28, 32, 33, 35, 37 and 40-42 is/are rejected.
- 7) ☒ Claim(s) 5, 6, 8, 9, 14, 17-19, 26, 29-31, 34, 36, 38 and 39 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12/06/00 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>2</u> . | 6) <input type="checkbox"/> Other: ____.  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. A.) The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-11 and 21-40 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Regarding claims 1, 21, and 33: The limitation of "identifying locations of a plurality of distinct facial features in the two images, the locations corresponding to a number of unknowns determined upon estimation of head motion" is not enabled by the specifications. The specifications describe, on page 13 under the section of "Motion estimation," that the locations are identified by the initial estimate of the relative head motion and not by the estimation of the head motion as described on bottom of page 14. Examiner does not take these two estimations of the head, initial estimate of the relative head motion and the estimation of the head, to be equivalent. While the claim language 1<sup>st</sup> limitation states that the locations are identified by the estimation of the head and the third limitation states that the estimation of the head is determined from the identified points. Which comes first the estimation of

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the head or the identification of the points/locations? Examiner will address these claims as best understood.

B.) The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-11 and 21-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding claims 1, 21, and 33: The limitation of "identifying locations of a plurality of distinct facial features in the two images, the locations corresponding to a number of unknowns determined upon estimation of head motion" makes the claim indefinite. The specifications describe, on page 13 under the section of "Motion estimation," that the locations are identified by the initial estimate of the relative head motion and not by the estimation of the head motion as described on bottom of page 14. Examiner does not take these two estimations of the head, initial estimate of the relative head motion and the estimation of the head, to be equivalent. While the claim language 1<sup>st</sup> limitation states that the locations are identified by the estimation of the head and the third limitation states that the estimation of the head is determined from the identified points. Which comes first the estimation of the head or the identification of the points/locations? Examiner will address these claims as best understood.

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Regarding claims 4 and 28: These claims are indefinite because the limitation of "reasonable value" is vague. What is a reasonable value? Is it 0? Is it 10? Is it 100? Is it a million? Etc.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 12 is rejected under 35 U.S.C. 102(e) as being anticipated by Steffens et al. (U.S. patent 6,301,370).

Regarding claim 12: One or more computer readable media containing a program that is executable by a computer to estimate motion between two images (col. 1 lines 13-16 and col. 2 lines 6-15), the program comprising the following actions:

determining locations of a plurality of distinct features in the two images (col. 4 lines 21-34, where the landmarks on the images are determined);

converting the identified locations into a set of parameters based on the symmetry of the distinct features (col. 8 lines 57-67 and col. 9 lines 1-22, where

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the locations are converted into facial parameters such as the eyes, nose tip, etc. It is inherent to one skilled in the art that a face is a symmetrical structure); and estimating motion between the two images based on the set of physical face parameters (col. 2 lines 6-15, col. 5 lines 30-35, and col. 9 lines 22-45, where the bunch graphs of the facial parameters are compared between images, i.e. if there a difference between images means that motion is present).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 7, 10, 11, 13, 15, 16, 20-25, 27, 28, 32, 33, 35, 37, and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steffens et al. (U.S. patent 6,301,370).

Regarding claims 1, 21, and 33: Steffens et al. discloses a method to estimate head motion between two images of a face (col. 1 lines 13-16 and col. 2 lines 6-15), the method comprising operations of identifying locations of a plurality of distinct facial features in the two images (col. 4 lines 21-34, where the landmarks on the images are determined) the locations corresponding to a number of unknowns determined upon estimation of head motion col. 4 lines 21-34, where the landmarks on the images are determined and each location is

seen/read as an unknown), the number of unknowns being determined by a number of equations (col. 6 lines 25-33, where trajectories of the motion are determined from the location landmarks, i.e. in order to determine the motion trajectories equations/mathematical calculation need to be used/performed to obtain these trajectories);

converting the identified locations into a set of physical face parameters based on the symmetry of the distinct facial features (col. 8 lines 57-67 and col. 9 lines 1-22, where the locations are converted into facial parameters such as the eyes, nose tip, etc. It is obvious to one skilled in the art that a face is a symmetrical structure).

estimating head motion from identified points in the two images, the identified points being based on the set of physical face parameters (col. 2 lines 6-15, col. 5 lines 30-35, and col. 9 lines 22-45, where the bunch graphs of the facial parameters are compared between images, i.e. if there a difference between images means that motion is present).

Steffens et al. discloses to track an object between two images by using landmarks which are converted into bunch graphs containing facial physical parameters. Steffens et al. does not disclose to reduce the numbers of unknowns as compared to the number of equations. It would have been obvious to one skilled in the art to reduce the number of unknowns/equations to make the system more efficient and faster.

Regarding claims 2, 13, 25, and 35: A method wherein the operation of estimating head motion further comprises:

calculating an estimation objective function (read as bunch graph) comprising a set of terms to estimate: (a) each of the set of physical face parameters (col. 8 lines 60-67 and col. 9 lines 1-21, where the facial parameters are determined from the bunch graphs) (b) a first head pose transform corresponding to the first image , (c) a second head pose transform corresponding to the second image (col. 1 lines 45-50 and col. 9 lines 21-45 wherein the bunch graphs of each image is compared, i.e. obtaining a bunch graph of each image is read as obtaining a transform pose of the head in a first and second image).

Regarding claims 3, 15, 27, and 37: A method further comprising after the operation of converting and before the operation of estimating, an operation of:

adding an inequality constraint on a particular face parameter of the physical face parameters, such that the particular face parameter is constrained within a predetermined minimum and maximum value (col. 6 lines 65-67, where a bounding box is determined and applied to the face, the bounding box is read as a inequality constraint, and the coordinates of the bounding box are the minimum and maximum values to the facial parameters).

Regarding claims 4, 16, and 28: A method wherein the particular face parameter corresponds to the nose tip (col. 9 lines 1-21); and



wherein the predetermined minimum value is zero (0) and the predetermined maximum value is a reasonable value based on absolute values of other of the locations (col. 6 lines 65-67, where the bounding box is seen as the constraint and its coordinates are seen as the values. It would have been obvious to one skilled in the art to make the left bottom corner of the box a minimum value of zero and the right top corner the maximum value).

Regarding claims 7 and 22: A method wherein the identified locations correspond to the eye corners, mouth corners and nose tip (col. 9 lines 1-21).

Regarding claims 10, 20, and 23: A method wherein the identifying comprises accepting input from a human user. Examiner takes official Notice because it is well known in the art wherein the system can be manual.

Regarding claims 11, 32, 40, and 42: A computer-readable medium storing computer executable instructions that, when executed on a computer, performs the method above (col. 4 lines 53-60).

Regarding claim 24: A method further comprising multiplying the refined head motion estimate by a confidence factor that indicates that each of the identified locations was identified with a same level of accuracy (col. 3 lines 63-67 and col. 5 lines 10-15, wherein confidence values are determined to indicate face motion reliability).

Regarding claim 41: A method comprising

Identifying locations of a plurality of distinct features in two images (col. 4 lines 21-34, where the landmarks on the images are determined), the locations

corresponding to symmetrical features shared between the two images, the locations being identified in a first coordinate system (col. 4 lines 21-34 and col. 6 lines 65-67, where the landmarks on the images are determined and a bounding box determined around the landmark region);

converting the locations into a second coordinate system that is based on the symmetry of the identified distinct features (col. 8 lines 60-67 and col. 9 lines 1-21), the locations being described by a set of coordinates in the second coordinate system; and

determining motion estimate between the two images using the set of coordinates (col. 5 lines 30-35 and lines col. 9 lines 21-45, where the each bunch graph between images are compared to determine the difference between the images, i.e. the motion).

Steffens et al. discloses to determine a bounding box around the landmarks that are located and then to determine the physical parameters inside the bounding box by creating a bunch graph. It is obvious to one skilled in the art that the bounding box has dimensional coordinates and is read as the first coordinate system and the bunch graph of the facial features are read as the second coordinate system because they also have coordinates but are different than the coordinates than the bounding box because they are locations inside the bounding box.

***Allowable Subject Matter***

4. Claims 5, 6, 8, 9, 14, 17, 18, 19, 26, 29, 30, 31, 34, 36, 38, and 39 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Paul et al. (Patent Pub. US 2002/0037770 A1) for motion tracking between two images.

***Contact Information***

6. Any inquiry into this communication should be directed to Anand Bhatnagar whose telephone number is 703-306-5914, whose supervisor is Amelia Au whose number is 703-308-6604, group receptionist is 703-305-4700, and group fax is 703-872-9306.

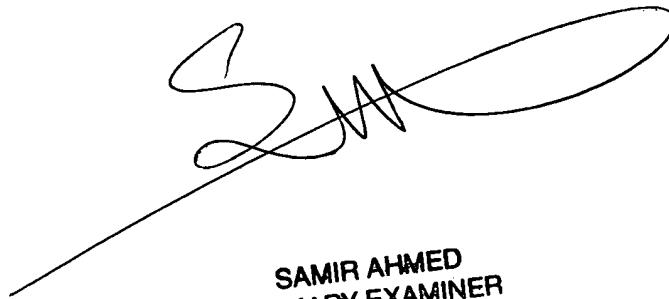
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AB

Anand Bhatnagar

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March 11, 2004

A handwritten signature in black ink, appearing to read 'SAMIR AHMED', with a long horizontal line extending from the left side of the signature.

**SAMIR AHMED  
PRIMARY EXAMINER**